LARIAC4: Image Capture and Aerotriangulation

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Agenda

Project Team Outline

Adjustments in Capture

- With more experience: Oblique Centric to Full Project
- Plane Allocation

Updated Sensor

- 16MP to 29MP
- Decrease in required AT Blocks

Ground Control

- Updates in procedure to avoid future delays

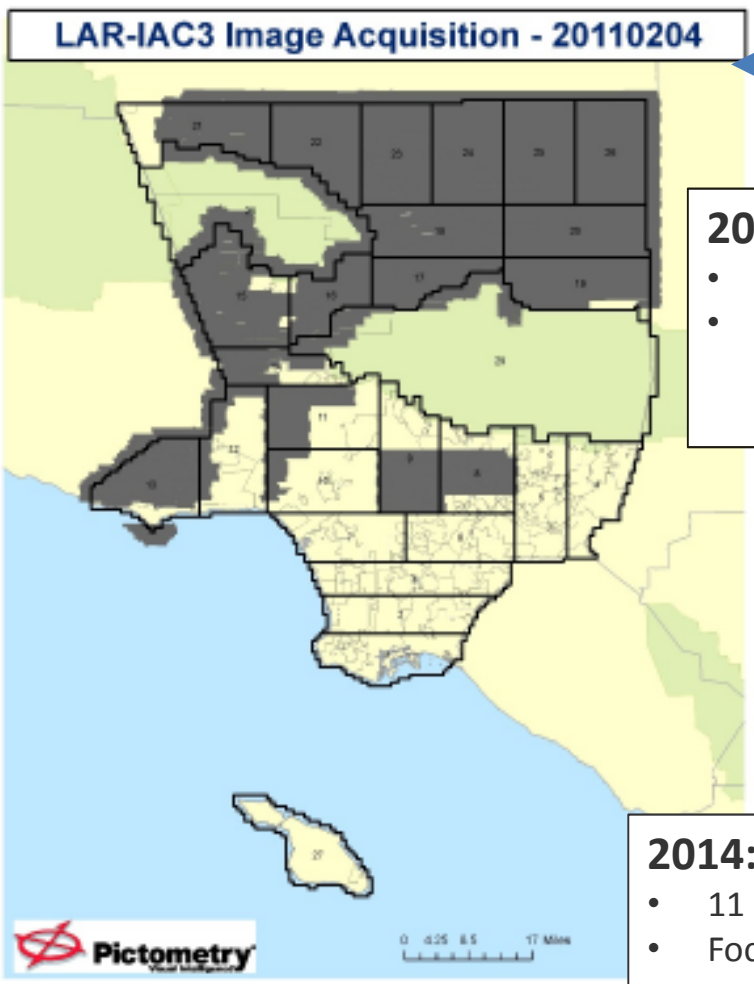
Current Capture Status & Schedule

Aero-Triangulation description

LARIAC4 Project Team

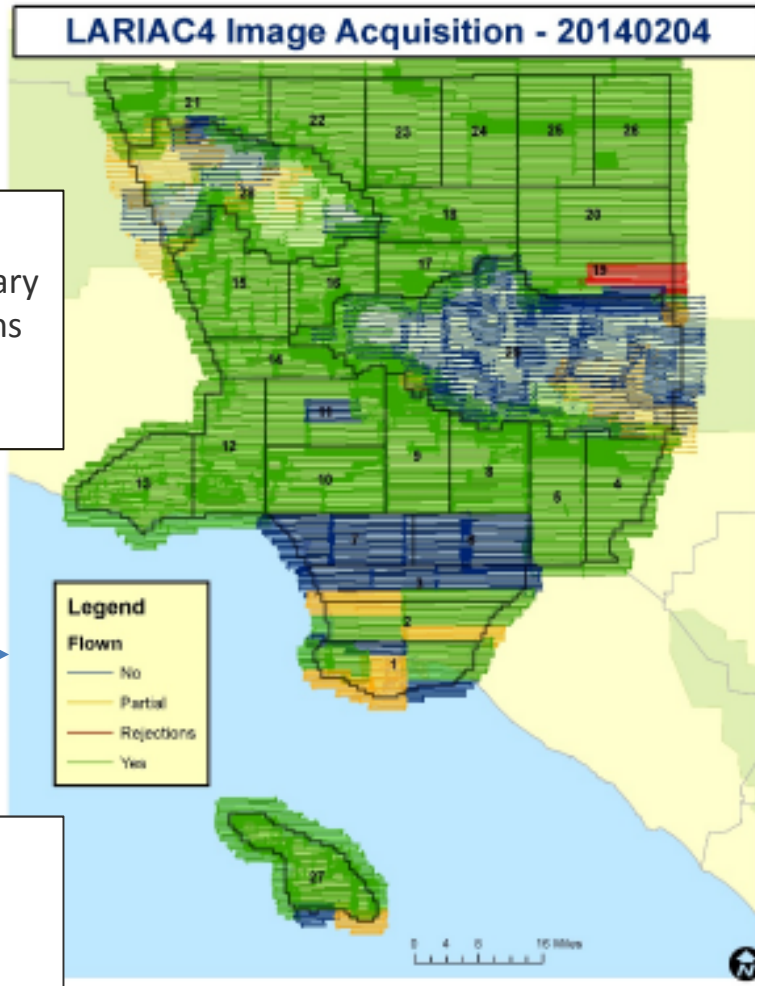
- Pictometry:
  - Aerial (ortho and oblique) and LiDAR Capture
  - Acquiring Ground Control
  - Aero-Triangulation
  - Training & Support
- Sanborn
  - Ortho Rectification and Correction
  - Building Outline Updates
- Dewberry
  - QC of AT
  - QC of Obliques
  - QC of Ortho Product

Adjustments in Capture: 2011 vs 2014



2011:

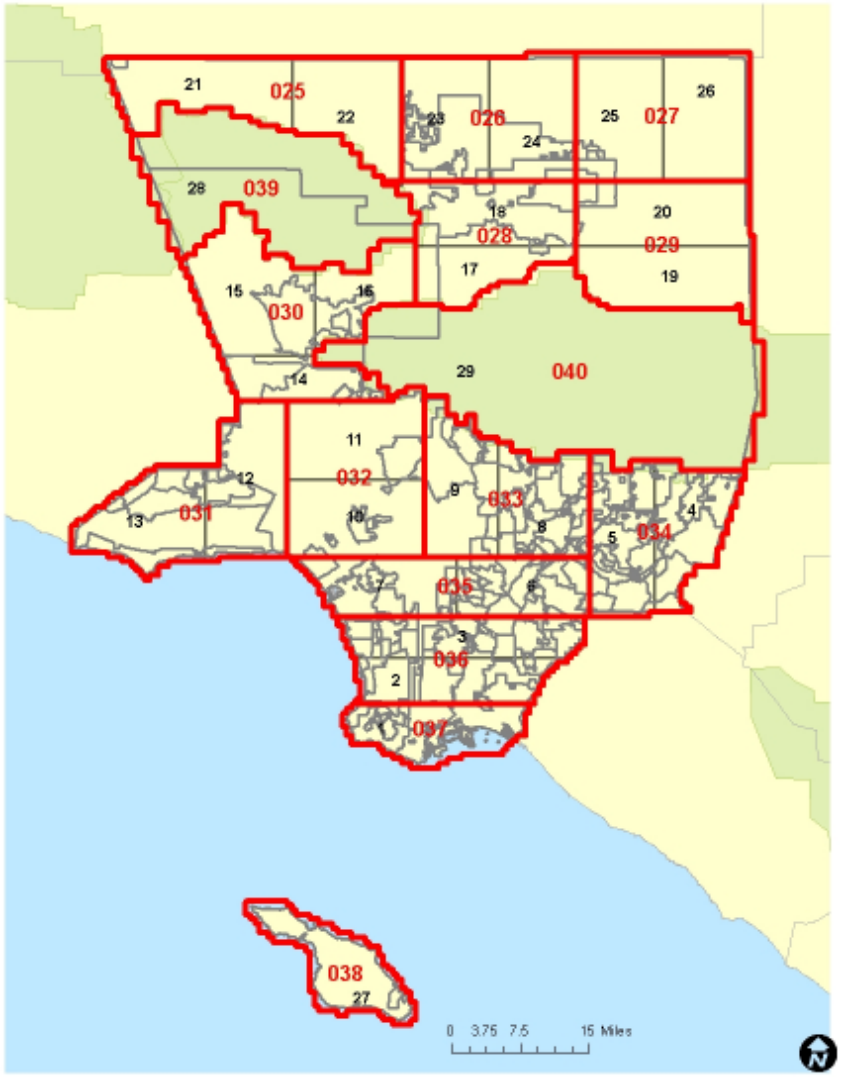
- 11 planes by Early February
- Focus on completing plans
  - North to South
  - Clogged airspace



2014:

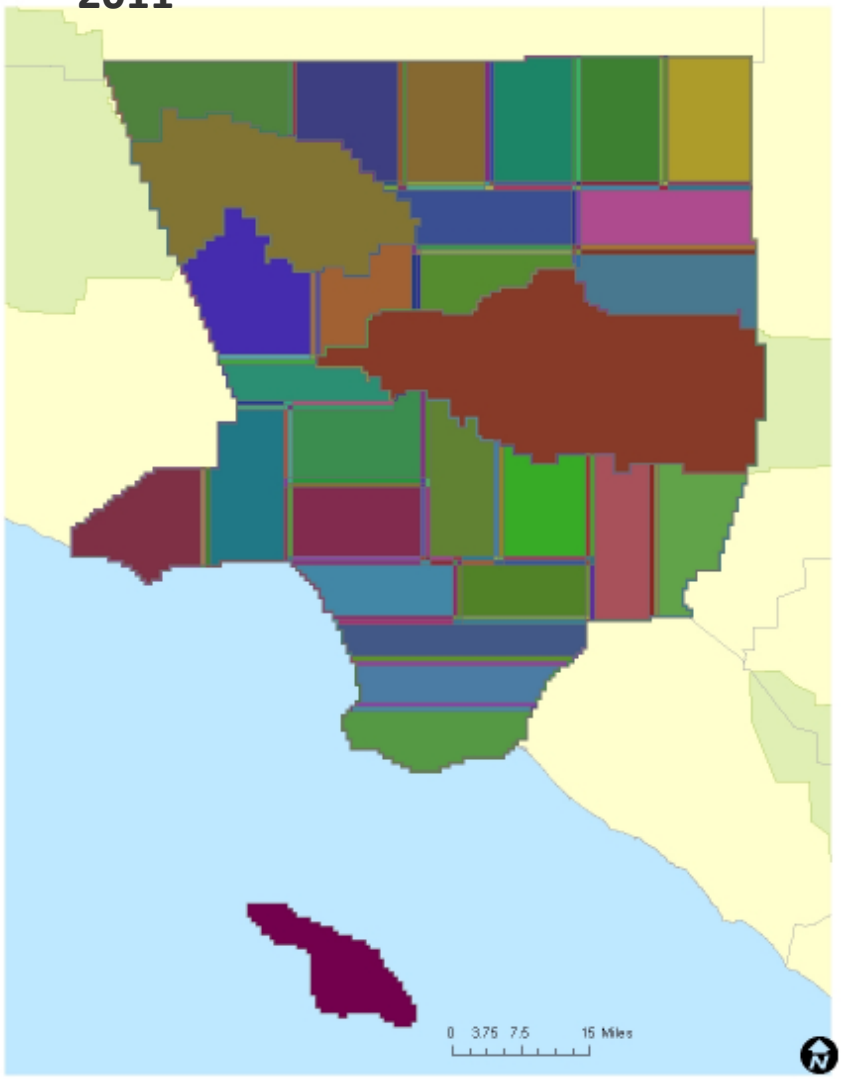
- 11 planes by early January
- Focus on completing plans
  - Maximize use of airspace
- More focus on flying by blocks
  - No need to wait for full project completion for AT

Updated Sensor – 29 blocks to 16 blocks

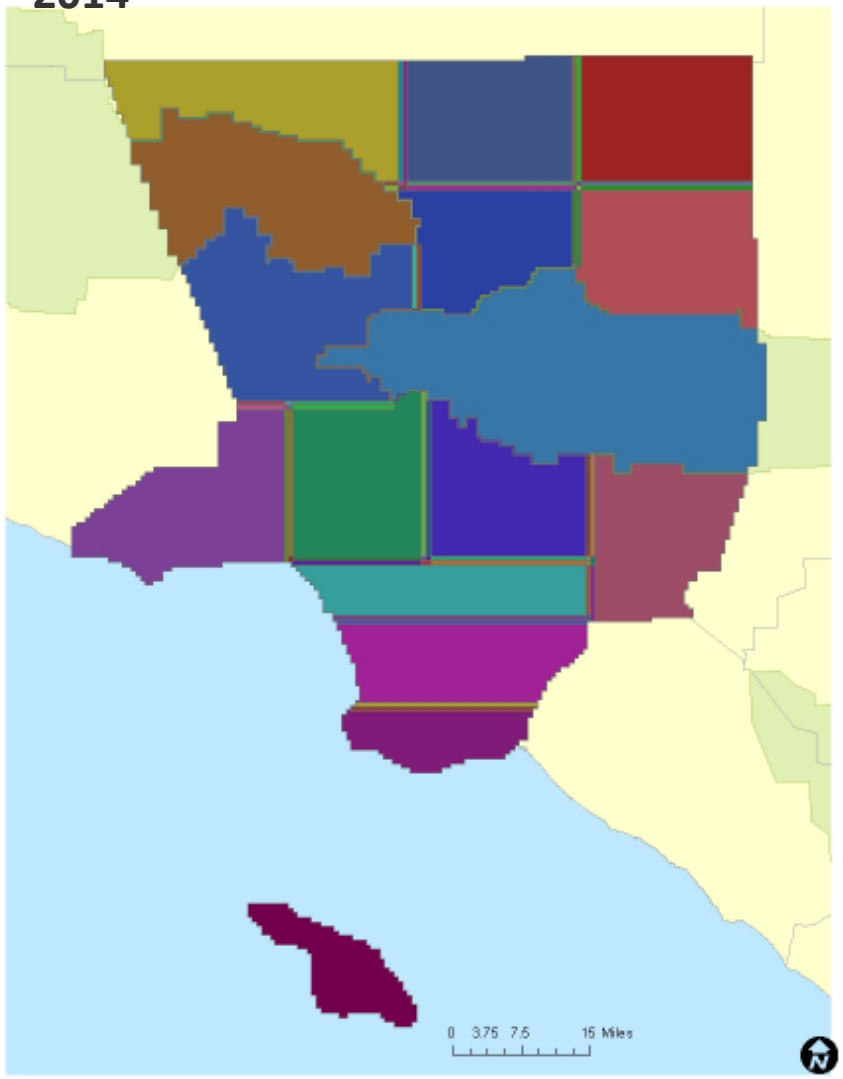


Updated Sensor: Cause and Effect on AT

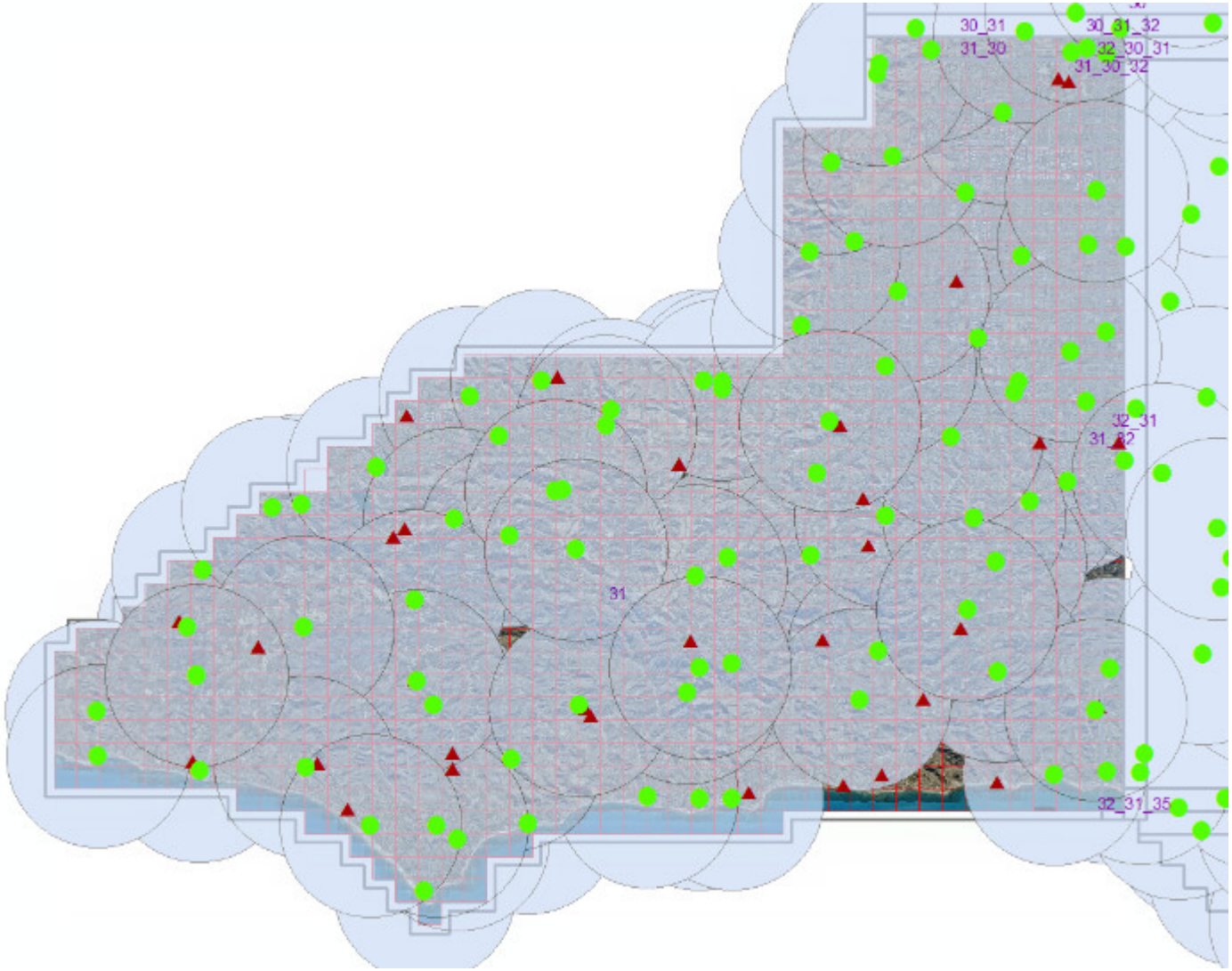
2011



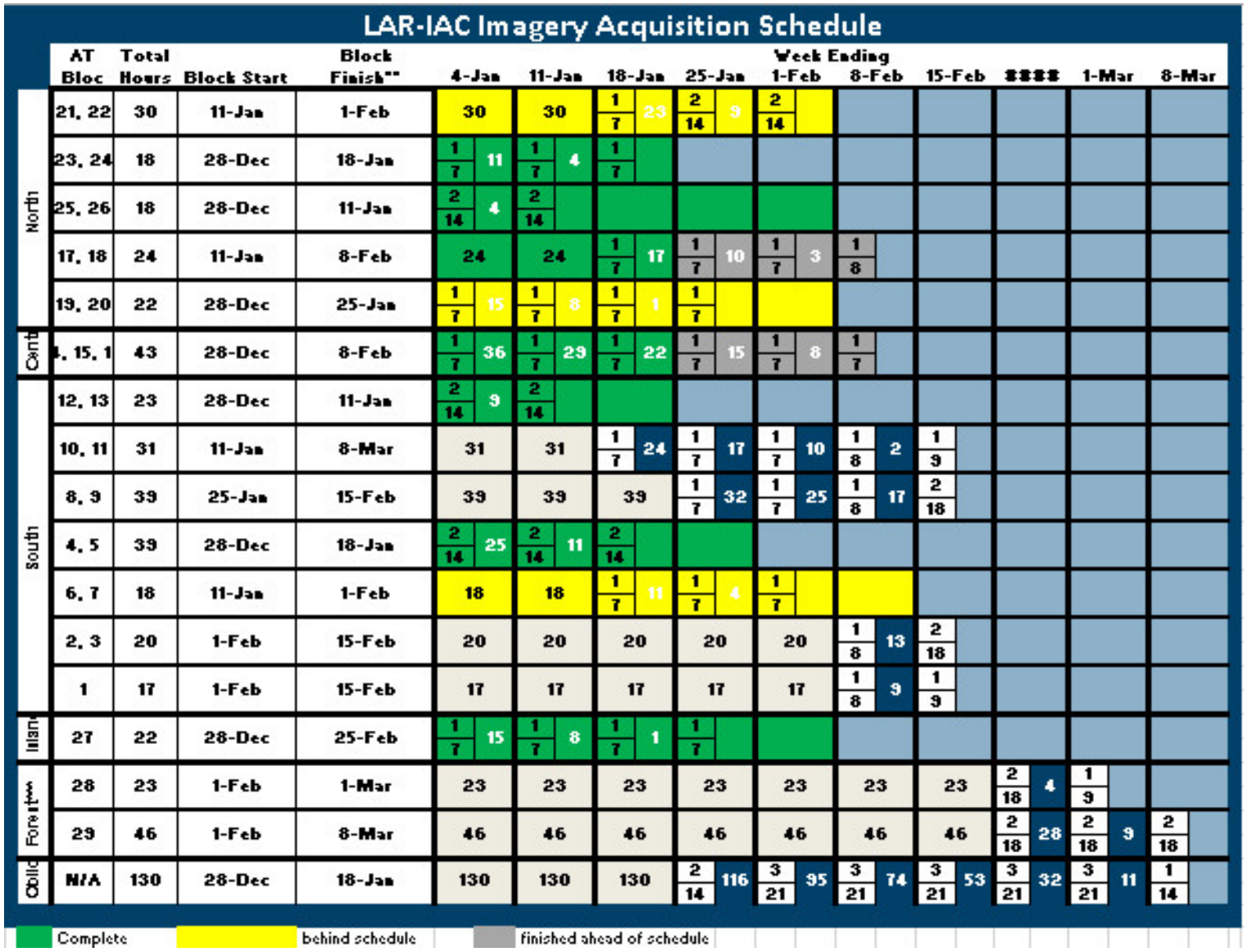
2014



Control: Updated Procedure



Flight Schedule



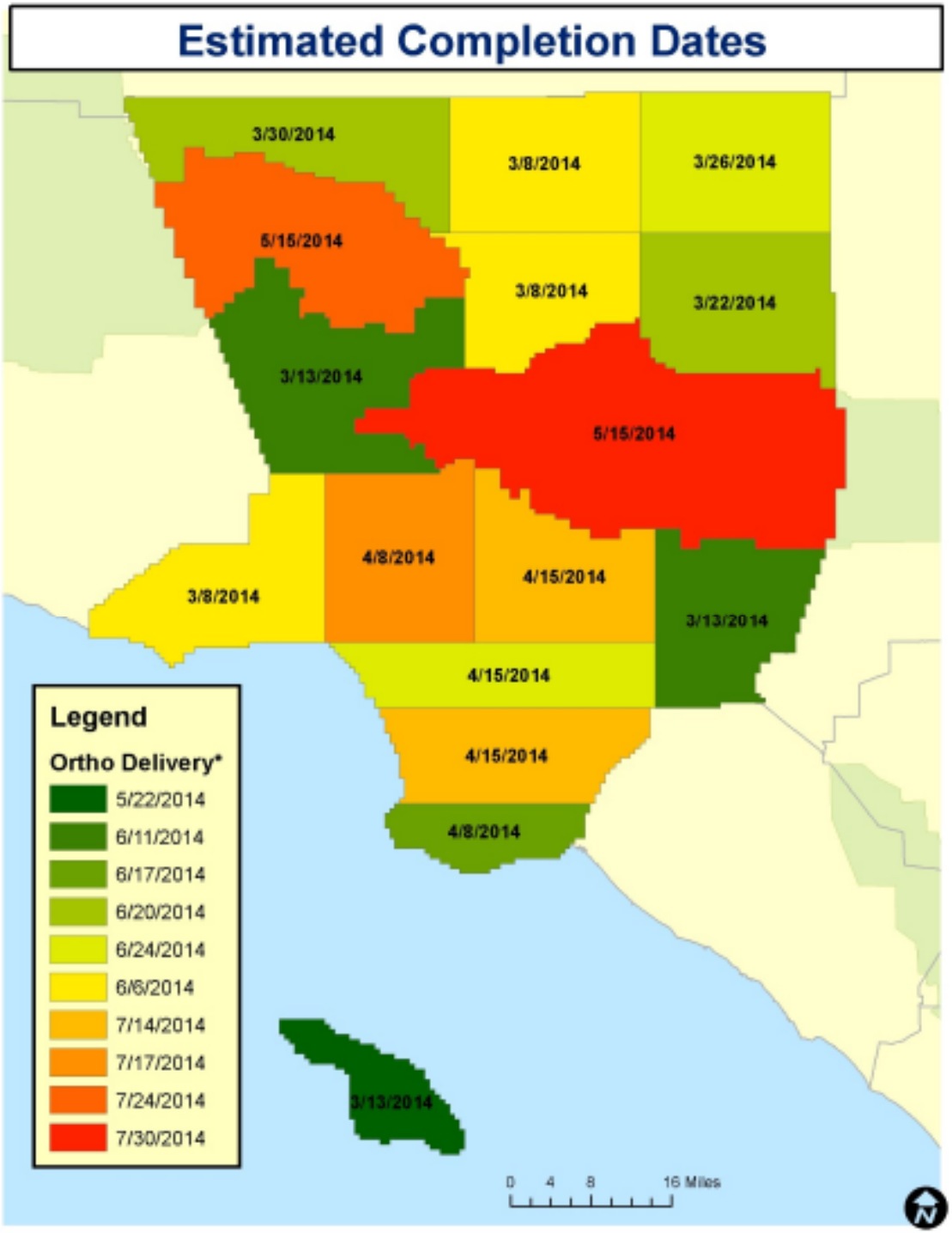
Updated Schedule

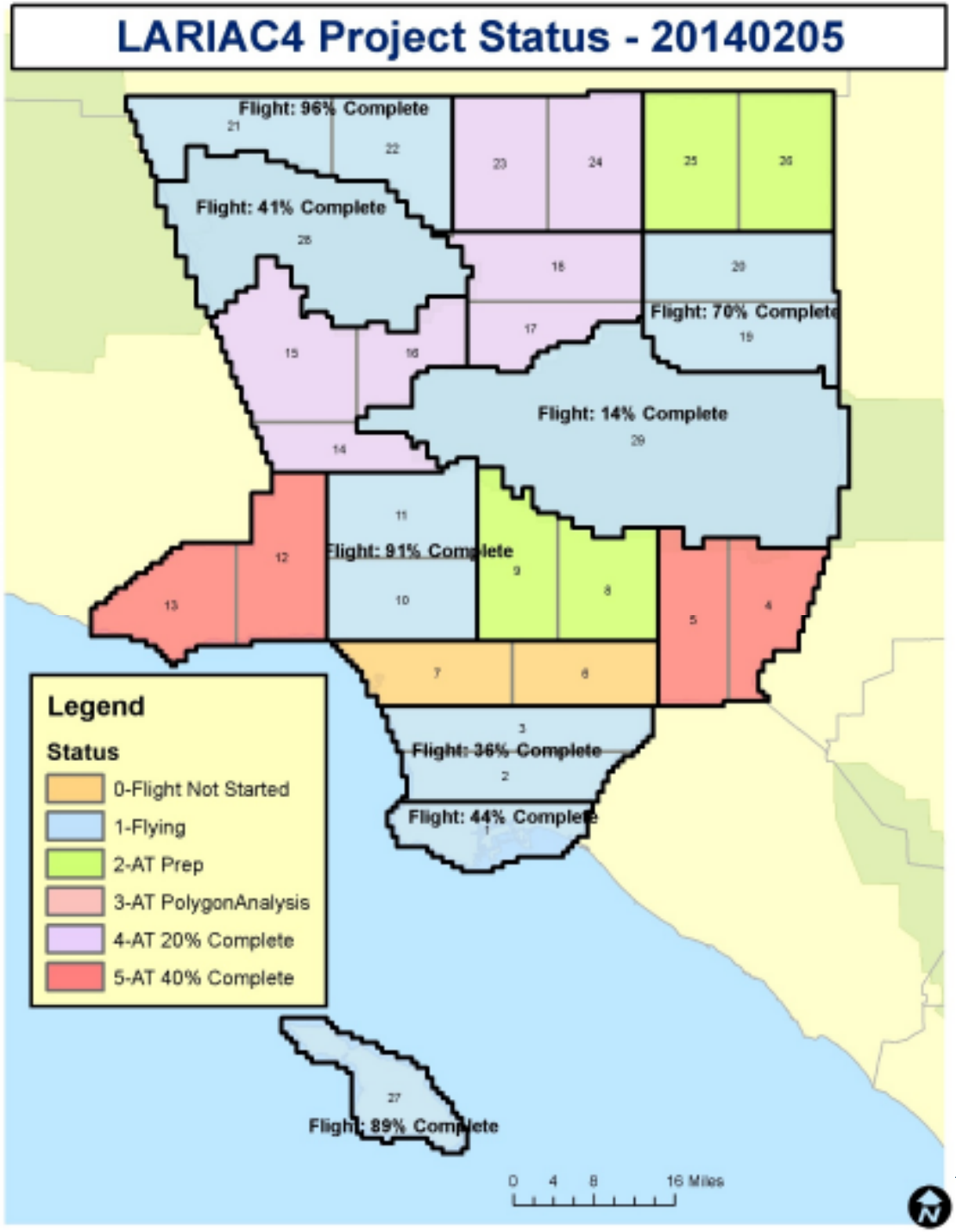
Orthogonal Imagery Details and Schedule By Block

AT Block(s)	Est. Total Ortho Frame Count	AT Start*	RFP AT Block Completion*	Updated AT Completion*	Ortho Delivery*
23, 24	13,063	25-Jan	8-Mar	8-Mar	6-Jun
25, 26	13,250	18-Jan	8-Mar	26-Mar	24-Jun
12, 13	16,076	18-Jan	8-Mar	8-Mar	6-Jun
19, 20	14,500	1-Feb	13-Mar	22-Mar	20-Jun
4, 5	14,324	25-Jan	13-Mar	13-Mar	11-Jun
27	7,200	8-Feb	13-Mar	13-Mar	22-May
21,22	14,630	8-Feb	22-Mar	30-Mar	20-Jun
17, 18	13,361	15-Feb	26-Mar	8-Mar	6-Jun
14, 15, 16	20,151	15-Feb	30-Mar	13-Mar	11-Jun
10, 11	14,641	15-Mar	8-Apr	8-Apr	7-Jul
1	5,902	22-Feb	8-Apr	8-Apr	17-Jun
8, 9	14,365	22-Feb	15-Apr	15-Apr	14-Jul
6, 7	9,943	8-Feb	15-Apr	15-Apr	24-Jun
2, 3	11,192	22-Feb	15-Apr	15-Apr	14-Jul
28	5,089	10-Apr	15-May	15-May	24-Jul
29	10,206	10-Apr	15-May	15-May	30-Jul

*Estimate

Estimated Completion Dates




LARIAC4 Project Status - 20140205
Flight: 96% Complete
Flight: 41% Complete
Flight: 70% Complete
Flight: 14% Complete
Flight: 91% Complete
Flight: 36% Complete
Flight: 44% Complete
Flight: 89% Complete
Legend
Status
0-Flight Not Started
1-Flying
2-AT Prep
3-AT PolygonAnalysis
4-AT 20% Complete
5-AT 40% Complete
0 4 8 16 Miles
N

Aerotriangulation (AT)

AAT

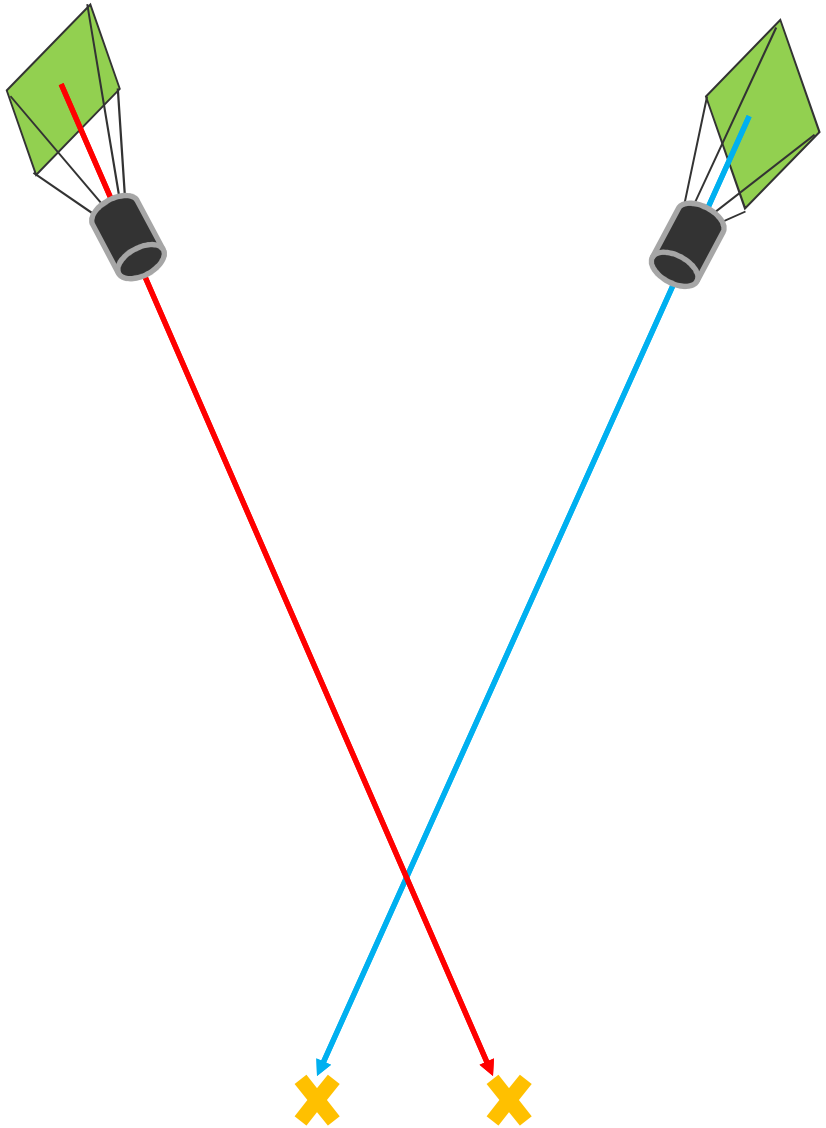
Used to improved image alignment

Tie Points between images generated automatically to improve *relative* accuracy

- Many automatic points are features not easily identified by the human eye
- 100-200 or more points per image

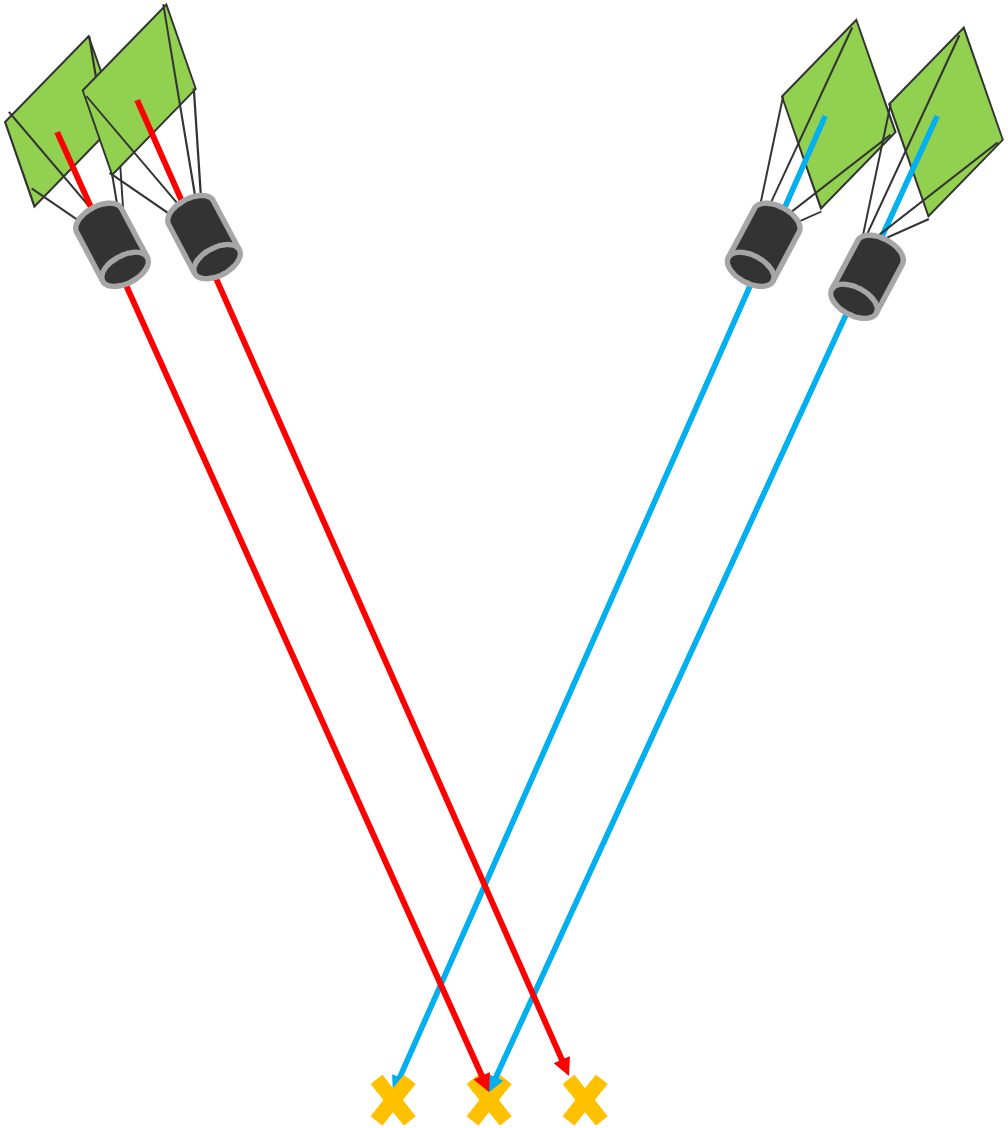
Surveyed Control Points are manually measured in imagery to improve *absolute* positional accuracy

Aerotriangulation (AT)



The purpose of AT is to recompute the camera centers in order to get the best possible alignment of features (tie points) between images as well as with the measured ground control points.

Aerotriangulation (AT)



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Aerotriangulation (AT)

Bundle Adjustment

Bundle adjustment is run to adjust final exterior orientation parameters (X, Y, Z, Roll, Pitch, Yaw) to minimize errors between frames

- Improves relative alignment
- With ground control, improves and verifies absolute accuracy!

Reporting

Total of 2411744 measurements in 10305 photos are used for adjustment (total 10305 photos)

sigma naught 1.6 micron (18:08:18)
sigma naught 1.6 micron (18:11:52)

found 45836 points connecting 2 photos
found 253615 points connecting 3 photos
found 67080 points connecting 4 photos
found 79354 points connecting 5 photos
found 82942 points connecting 6 photos
found 21626 points connecting 7 photos
found 15504 points connecting 8 photos
found 7036 points connecting 9 photos
found 3498 points connecting 10 photos
found 1311 points connecting 11 photos
found 253 points connecting 12 photos
found 17 points connecting 13 photos

number of observations	4875218
number of unknowns	1796064
redundancy	3079154

RMS automatic points in photo (number: 2406481)	x=1.3 micron		y=1.3 micron,
RMS control and manual points in photo (number: 174)	x=3.8 micron		y=3.6 micron

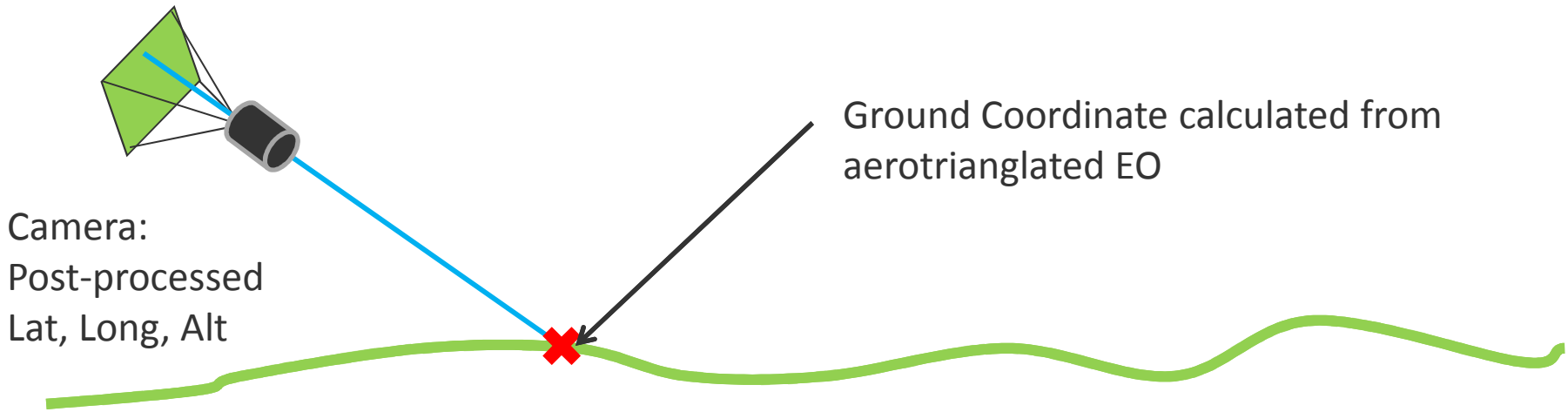
RMS control points with default standard deviation set (number: 26)

	x =0.090 [feet]	y=0.106 [feet]	z=0.009 [feet]

RMS IMU observations (number: 10305)	omega=0.009 [deg]	phi=0.009 [deg]	kappa=0.016 [deg]

RMS GNSS observations (number: 10305)	x=0.220 [feet]	y=0.262 [feet]	z= 0.416 [feet]

Refined EOs



- Refined EOs used for Certified Ortho Product
- Imagery now accurate to < 1m
- Inter-frame alignment < 3 pixels

Thank you! Questions?